

ago show a small shadow suggestive of a calculus in the lower pole of the right kidney.

*After-treatment.* The after-treatment of urinary calculi is of extreme importance in preventing the formation of new stones, or an increase in size of existing ones, the removal of which is contra-indicated.

In calcium phosphate stones, milk, eggs, fish, beer, wine and fruits are to be avoided on account of their calcium content. Drugs rendering the urine acid, as sod. benzoate, or acid sodium phosphate should be given, and large quantities of water taken. In uric acid stones, the diet should consist principally of carbohydrates, vegetables and fat. Alkalis are indicated internally, also plenty of water. In oxalic acid stones, increase the calcium and decrease the acidity. Very few carbohydrates should be given, on account of their tendency to fermentation which increases the formation of oxalic acid.

The rare cystin stones are present in those individuals who have lost the power of oxydizing the sulphur containing constituent of their protein, consequently intake of the latter should be greatly restricted.

#### ACUTE DILATATION OF THE STOMACH. A REPORT OF SIX CASES, THREE OCCURRING DURING ANESTHESIA.

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In 300 anesthetics, covering a period of four years, I have encountered four cases of acute gastrectasis, two occurring during anesthesia. To these, two more cases observed, may be added, one of which occurred during anesthesia.

The most important symptoms are vomiting, abdominal distension and collapse. Thirst is also an important symptom. Pain is variable. Hiccough, cyanosis, giddiness, and syncope are rarer symptoms. The stomach contents are usually watery, at first yellowish or greenish, later on becoming brownish, or black, from admixture with blood. In five of the cases reported here, the contents have been black or brownish from the first, being typically coffee-ground in character. As a rule bile is present, and a varying amount of hydrochloric acid.

Borchgrevink mentions the cases as falling into one of eight groups. His paper is the most recent and thorough covering of the literature, that I can find. It seems strange, however, in his review of 144 cases of acute dilatation, no mention is made of the condition occurring during anesthesia. His groups are: Post-operative; During acute illness or convalescence; During chronic illness; Disorders or deformities of the spine; Overloading of the stomach; Blow on abdomen; Confinements; Without apparent cause. To these

groups I would add: During anesthesia; to cover some of the reported cases, as well as the three herein reported.

Paralysis of the stomach is the oldest and most generally accepted explanation for the condition. Primary mechanical occlusion of the duodenum with secondary dilatation of the stomach, and primary gastric dilatation, whether neuro- or musculo-paresis, and secondary mechanical occlusion of the duodenum, either by direct pressure of the stomach on the duodenum in its passage in front of the spine, or by secondary arterio-mesenteric compression brought about by the distended stomach's pressure on the small intestines, are two other important hypotheses. Albrecht held that the dilatation was due to a primary constriction of the duodenum by the superior mesenteric artery, through dragging on the root of the mesentery. Other factors, such as a pre-existing chronic dilatation of the stomach, gastric hyper-secretion, spastic occlusion, and a simultaneous vulvular kinking of the pylorus and cardia have been urged as the primary cause.

Most of the causes given are easily disproven by a clinical consideration of the cases studied, and the etiological question is to be decided between a paralysis of the stomach, and arterio-mesenteric compression. Von Haberer differentiates between acute dilatation of the stomach, and what he terms acute arterio-mesenteric ileus. The latter gives practically the clinical picture of a high intestinal obstruction. The mechanics of this condition are as follows: The band formed by the superior mesenteric artery lying across the transverse portion of the duodenum, is pulled upon by that portion of the small intestines lying in the pelvis. The duodenum is now compressed between the artery and the spine, the pull upon the mesentery having obliterated the angle between these two structures. Now, either the stomach empties itself by repeated vomitings, or the angle of the esophagus with the cardia may form a valve, preventing the stomach from emptying, and leading to dilatation.

For this condition to occur, the bowel must be empty, and have a fairly long mesentery, long enough to reach into the pelvis, so that by its weight, traction would be exerted upon the superior mesenteric artery.

In favor of the paralysis theory is the clinical evidence of the appearance of acute dilatation in disorders of the spine, illnesses of the nervous system, severe injuries, and the influence of anesthesia in causing paralysis. A short review of the few cases in this series will show, at least the clinical evidence, of a predisposing cause in anesthesia.

Case 1. Male, age about 50. Acute dilatation of the stomach about 14 hours after laparotomy. Ether anesthesia. Patient in extreme collapse when first seen. Died.

Case 2. Female, age 46. Acute dilatation during abdominal Caesarian section by Dr. E. A. Julien of Turlock. Very little collapse, violent retching but no vomiting on the table. Stomach washed out immediately, large quantity of coffee-ground material in washings. The patient did not have any after effects, not even vomiting after operation, and had a normal convalescence, although at

the time the dilated stomach filled the entire abdominal cavity.

Case 3. Female, age 60. Acute dilatation during operation for varicose veins of leg by Dr. P. N. Jacobson of Turlock. Ether anesthesia. Extreme distention of the abdomen, violent retching, with but slight vomiting, and extreme collapse occurred on the table. The stomach was washed out immediately, and the typical coffee-ground material noted again. The anesthetic was then continued until the completion of the operation. Convalescence was delayed, the patient being very sick for a week following operation.

Case 4. Female, age 58. Acute dilatation occurring six hours after appendectomy by Dr. Jacobson. Ether anesthesia. This case before going to the hospital had drunk very heartily of fresh milk. This was noticed at the completion of the operation, during gastric lavage, which is practised as a routine. Great chunks of curdled milk were noted, but the washing was, unfortunately, not thorough enough, due to the patient awakening too soon. When first seen by me after operation, she was in extreme collapse. She was treated by saline hypodermoclysis, gastric lavage, and the prone position. Recovery took place in three days.

Case 5. Female, age 59. Ether anesthesia. Acute dilatation four days following abdominal section for inoperable carcinoma of pancreas. Patient's abdomen before operation greatly distended by ascites, which was relieved by operation. Patient in bad shape for over a week, although repeated stomach washings and prone positions brought relief. Typical coffee-ground material noted in this case.

Case 6. Male, age 22. Ether anesthesia, by Dr. Wilson. Operation for wiring tibia for non-union, by Dr. Jacobson. Acute dilatation about the end of anesthesia. Extreme collapse for the time being. Thorough stomach washing brought immediate relief. Coffee-ground material noted in this case.

From a personal communication with Dr. E. A. Julien I have knowledge of another case of acute dilatation which occurred during anesthesia, while the abdomen was opened.

The treatment of this condition is repeated stomach washings, and placing the patient in the prone position, with a pillow under the pelvis. The results with the latter method are often miraculous, the patient noticing relief immediately. In cases 4 and 5, I noticed this effect, especially in the latter case, where the patient would ask to be turned back, after trying some other position for a short while.

Hypodermoclysis has been useful in supplying the body with fluid to make up that lost by secretion into the stomach. In case 4 it was used, along with the washings and posture, with decided benefit.

The striking benefit obtained from posture, is decided evidence in favor of arterio-mesenteric compression, as a cause of, or a factor in, acute dilatation. On the other hand, the paralyzing influence of the anesthetic can not be dispensed with, in this series, at any rate.

Caution against too thorough emptying of the bowels before operation, so that the bowels would be completely empty, and against filling the stomach, either with fluid or food in too great a quantity after operation, has been urged as a prophylactic measure. I would urge gastric lavage at the end of every anesthesia, as a prophylactic measure of great value. Had case 4 been properly

washed out, so that the stomach would have been empty, instead of being filled with curdled milk, the condition, it is reasonable to suppose, would have been prevented.

Women are more prone to acute dilatation than men, in the proportion of 60 to 40. In regards to age, 75% of all patients reported are between 10 and 40 years of age. The last five cases reported gave me the chance for close observation, either as anesthetist, consultant, or surgeon. Of those, four are women, averaging, however, well over 50 years of age.

The mortality in Borchgrevink's series of 144 cases is 54.1%. He reports Conner giving a mortality in 1907 of 72.5%, and Laffer in 1908, giving 63.5%.

These records include both medical and surgical treatment. Surgery has proven a failure, with a very bad prognosis. In untreated cases the prognosis is also extremely bad. In 23 cases reported by Borchgrevink, treated surgically, 18 died. In 31 cases treated medically, he reports 29 deaths, with one case cured by apomorphine, and one by hypodermoclysis. In 48 cases treated by the stomach tube, 24, or 50%, died, while in 26 cases treated by posture, only 3 died, or about 12%. The striking benefits of postural treatment, in this dangerous condition, is evident, by a comparison of his tables.

In case 1, which died, postural treatment was not attempted. This case happened while in my interne year, and helped me to realize the severity of this condition. In case 2, stomach washing at the time of operation was sufficient. In the remaining 4 cases, treatment consisted of stomach washings plus the prone position, and recovery took place in all four cases.

Three interesting cases are reported last year, two by Luckett, and one by Mayoral, in which acute dilatation occurred during laparotomy, and in all the cases the major feature was the expulsion of enormous quantities of gas, without any fluid being obtained, when the stomach tube was passed. Luckett attributes the acute dilatation in his two cases, to the gulping of air into the stomach, with the resultant distention. All three cases made an uneventful recovery after stomach washing. Crandon and Ehrenfried give an account of two cases, one in their surgical practice, and one reported by Torbet, of acute dilatation during operation for abdominal Caesarean section. No details are reported, however.

In my three cases noticed during anesthesia, coffee-ground material was noticed, in the last case giving the clue to the condition before any other symptom. Gas, while present in all cases, was hardly a leading symptom. In case 4, overloading of the stomach before operation, was undoubtedly a strong factor, together with the anesthetic, in bringing about the dilatation.

#### Bibliography.

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